

30111
S/194/61/000/007/021/079
D201/D305

16.9000 (1031, 1250, 1329)

AUTHORS:

Arkhangel'skaya, A.A., Lazarev, V.G., Roginskiy, V.N.
and Sergeyeva, O.F.

TITLE:

A computer for synthesizing relay-switching systems

PERIODICAL:

Referativnyy zhurnal. Avtomatika i radioelektronika,
no. 7, 1961, 51-52, abstract 7 V383 (V sb. Probl.
peredachi inform., no. 6, M., AN SSSR, 1960, 5-23)

TEXT: Principles are described of the design of a computer for synthesizing relay systems as designed at the Laboratory of Information Transmission Systems of the AS USSR. The conditions which the synthesizing computer should satisfy are set at a switch panel in the form of inputs and outputs. The circuit diagram of the panel is set to test whether the given conditions can be realized and when it shows that these conditions cannot be realized, it determines the minimum number of relays which have to be used for these conditions to be realized. After this, various variants of the circuits are

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designed and the computer chooses the one which has the minimum number of switches or in which the given distribution of relay switches has been obtained. The device design is based on the graphical method of synthesizing switching multiple-pole networks. The final circuit is shown on a lamp register. 10 references.

[Abstracter's note: Complete translation]

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16,9000

AUTHOR:

Lazarev, V.G.

TITLE:

Mechanization of the process of determining the minimum number of intermediate relays

PERIODICAL:

Referativnyy zhurnal. Avtomatika i radioelektronika, no. 7, 1961, 52, abstract 7 V387 (V sb. Probl. pere-
dachy inform., no. 6, M., AN SSSR, 1960, 24-33)

TEXT: The algorithm is analyzed of the process of choosing the minimum required number of intermediate functional elements (relays, keys, etc.) with the help of which it is possible to realise the given conditions. It consists of a consecutive reading of cadences of the manipulation chart with simultaneous checking whether the realization conditions are satisfied or not. If they are not, a new condition of intermediate relays is introduced. Two variants of algorithm are given together with the examples design of the chart which is being realized. The developed algorithm is used as

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the basis of the corresponding bloc in the computer for synthesizing
relay circuits as developed at the information transmission systems
Laboratory of the AS USSR. 9 references. [Abstracter's note: VB

Complete translation]

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LAZAREV, V. G.

PHASE I BOOK EXPLOITATION

SOV/5741

Akademiya nauk SSSR. Laboratoriya sistem peredachi informatsii.

Problemy peredachi informatsii. vyp. 8: Postroyeniye skhem releynogo deystviya (Problems of Information Transfer. v. 8: Designing of Relay Circuits) Moscow, Izd-vo AN SSSR, 1961. 131 p. Errata printed on the inside of back cover. 2,600 copies printed.

Resp. Ed.: V. N. Roginskiy; Deputy Resp. Ed.: V. G. Solomonov; Tech. Ed.: L. V. Yepifanova.

PURPOSE: This collection of articles is intended for scientific and technical personnel concerned with the transfer of information.

COVERAGE: The book contains eight reports on the designing of relay systems. The reports were submitted by scientific workers of the Laboratoriya sistem peredachi informatsii Akademii nauk SSSR (Laboratory of Information Transfer Systems, AS USSR) to the seminar of the laboratory.

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Lazarev, V. G., O. A. Oganov, and V. N. Roginskiy. Fundamentals in Designing a Contactless Computer for the Synthesis of Relay Switching Circuits

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The basic principles in designing individual contactless units of a special-purpose high-speed computer used for the synthesis of relay switching circuits are presented. Submitted 12/26/1959.

Arkhangel'skaya, A. A., V. G. Lazarev, and Ch'en Chun-liang. Concerning the Complexity of Realizing Boolean Functions by Switching Circuits

20

In the graphic designing of (1,k)-terminal switching circuits the number of contacts in individual relay is evaluated. The complexity problem in the realization of Boolean functions by switching circuits is reviewed. The upper bound of the number of contacts for relays of a universal (1,k)-terminal network realizing all the set-ups of k Boolean functions of

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of n variables is discussed; the upper and lower bounds of the number of contacts for the relays of a pseudo-universal $(1,k)$ -terminal network which does not realize all the set-ups of k Boolean functions of n variables are obtained. Methods for determining the "capacity" of a computer for the synthesis of switching circuits are proposed on the basis of upper and lower bounds of the number of contacts in the relays of an $(1,k)$ -terminal network. Submitted 5/17/1960.

Ch'en Chün-liang. Concerning the Evaluation of Switching-Circuit Complexity

45

Propositions presented in the preceding article are developed. The problem of evaluating the complexity of switching $(1,k)$ -terminal networks when the graphic method is used in designing circuits, is examined. Formulas for calculating fractions of the set-ups (i.e., the ratio of the number of occurrences of specific functions to the total number of the occurrences of functions) of k Boolean functions of

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n variables are derived for the case when they are realized by a given number of branches and contacts in a single cross section, as well as by a definite number of contacts in the circuit as a whole. In the second instance the fact that the occurrence of Boolean functions on the cross section is not of equal probability is taken into account.

Submitted 4/16/1960.

Roginskiy, V. N. Graphic Designing of Switching Circuits With Bypass Paths

67

General methods are presented for the transformation of set-up numbers for a graphic synthesis of multi-terminal switching networks, taking into account bypass paths which are formed in connection with the construction of direct deductions. A method is given for clarifying different variants arising from the nonsinglevaluedness of the set-ups during the construction of direct deductions. Submitted 2/17/1960.

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Ch'en Chün-liang. Concerning the Distribution of Probabilities of Occurrence of Boolean Functions

74

The article discusses the problem of variation in probability distribution of the occurrence of Boolean functions passing from one cross section to another in the presence of direct deductions when the switching circuits are designed by the graphic or symbolic method. Formulas are derived for calculating the probability of occurrence of Boolean functions in various cross sections, provided the probability distribution of their appearance on zero cross section is known. Submitted 3/12/1960.

Sagalovich, Yu. L. The Measure of Ordering of a Boolean Function

88

On the basis of the results of writing switching circuits in the form of Boolean functions, the value k is introduced as a minimum number of set-ups of variable values sufficient for identifying a Boolean function.

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Methods of calculating this value which utilize the properties of various classes of Boolean functions, as well as methods of evaluating it, are given. The method of designing the inertia group of a Boolean function is completed, and a scheme is designed which permits a) carrying out group transformations of Boolean functions; b) constructing equivalent (in the sense of noiseproofness) uniform codes.
Submitted 6/26/1959.

Lazarev, V. G., and O. A. Oganev. Grapho-Analytical Method of the Synthesis of Contactless Relay Circuits

109

The method of plotting a block-diagram with parametric relationships of a logical (1,k)-terminal network which realizes Boolean functions using logical gates AND, OR, and NOT, is studied.
Submitted 2/17/1960.

Maystrova, T. L., and V. N. Roginskiy. Relay Circuits With Parametric Relationships and Many-Valued Logic

121

Operating conditions of a relay in a circuit with parametric relationships are examined. It is

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demonstrated that the proposed apparatus of many-valued logic may serve for describing the operation and equivalent transformations of such circuits. Submitted 2/5/1960

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JP/dfk/mas
11-8-61

33508
S/562/61/000/009/008/012
D201/D302

16.6800 (1024, 1329, 2403)

AUTHOR: Lazarev, V. G.

TITLE: Synthesis of "OR-AND" contactless relay switching circuits

SOURCE: Akademiya nauk SSSR. Laboratoriya sistem peredachi informatsii. Problemy peredachi informatsii. No. 9, 1961. Elementy sistem avtomatiki, 144-149

TEXT: The author shows that the method of synthesizing contactless switching circuits as developed for the sake of simplifying (Boolean) functions denoted in disjunctive normal form, owing to the duality of the disjunctive and conjunctive normal forms, may be generalized over to the Boolean functions written in a conjunctive normal form. To do so, the idea of "pseudo-numbers" is introduced which are taken as the digital equivalent of the null decomposition constituent, obtained according to the following rule: Every variable has its attributed "weight" 2^{i-1} , where i is the consecutive number of the variable. To go over to a fully conjunctive form a

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fully disjunctive normal form it is necessary to set-up a function from constituents not belonging to the given fully disjunctive function and to invert it. It follows that in order to go over to pseudo-numbers the following procedure has to be used: The given assembly of numbers is first inverted and then all assembly numbers are replaced by pseudo-numbers so that the sum of the number l_1 and of the pseudo-number r_1 be equal to $l_1 + r_1 = 2^{n-1}$. The method of contactless switching system design of type OR-AND is thus analogous to that of type AND-OR, in which all operators AND are substituted by OR and vice versa. Numerical examples show that depending on conditions either types AND-OR or OR-AND circuits may be simpler and for an optimum solution of the circuits both variants are required. There are 3 figures and 6 Soviet-bloc references.

SUBMITTED: August 5, 1960

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S/194/62/000/007/057/160
D295/D308

AUTHORS: Lazarev, V.G., and Oganov, O.A.

TITLE: An analytical method of the synthesis of contactless relay circuits by means of graphs

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika, no. 7, 1962, abstract 7-2-149 m (In collection: Probl. peredachi informatsii, no. 8, M., AN SSSR, 1961, 109 - 120)

TEXT: A method is given for designing single-cycle relay systems consisting of contactless AND, OR and NOT functional blocks. The design process is carried out by proceeding from the circuit outputs, to which Boolean functions with obligatory and conditional terms are attributed. The transformation of such functions, when the AND, OR and NOT operators (blocks) are used, is shown. By writing the conditions in normal disjunctive form, simplification (minimization) of the notation is obtained, after which coinciding functions emerge. The outputs with coinciding functions are unified, and the unified function is attributed to them. It is convenient in certain

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cases to introduce the NOT operator if one of the function is found to coincide with another after inverting. At each of the points that remain after carrying out the unifying procedure the output of an OR functional block (operator) is drawn, with a number of inputs equal to the number of terms in the function. One attributes to each input the corresponding new function, or several functions in the presence of multivaluedness determined by conditional terms. Unifying possibilities are again ascertained, and the AND operator, and then the NOT operator, are introduced. The structure of a three-seven-terminal network which realizes 7 functions of three variables is shown in the figure. Additional operations that sometimes enable the circuit to be simplified are cited, and the possibility of introducing the operators in a different order is indicated. 16 references. [Abstracter's note: Complete translation.]

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9.7/60

16.6800 (24031327, 1329)

32588

S/569/61/003/000/007/011

D201/D305

AUTHORS: Lazarev, V.G., and Parkhomenko, P.P. (USSR)

TITLE: Mechanization of analysis processes and of the structure synthesis of switching circuits

SOURCE: International Federation of Automatic Control. 1st Congress, Moscow, 1960. Statisticheskkiye metody issledovaniya. Teoriya struktur, modelirovaniye, terminologiya, obrazovaniye. Moscow, IZd-vo AN SSSR, 1961, 357 - 367

TEXT: The authors present certain results of research on the mechanization of the processes of analysis and of synthesis of switching circuits as obtained at the Institut avtomatiki i telemekhaniki AN SSSR - IAT (Institute of Automation and Telemechanics, AS USSR) and at the Laboratoriya sistem peredachi informatsii AN SSSR - LSPI (Laboratory of Information Transmitting Systems, AS USSR). The machine for analysis of relay switching circuits was developed in 1957 at IAT by P.P. Parkhomenko, under the leadership of Professor M.A. Gavrilov. The first model of the machine for the synthesis of Card 1/54

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switching circuits, consisting of four relays with two output circuits each, was developed in 1956 at the LSPI by a group consisting of V.G. Lazarev, A.A. Arkhangelskaya and S.S. Kraynov under the leadership of V.N. Roginskiy. The second perfected model was developed in 1957-1959 at LSPI by A.A. Arkhangelskaya, O.F. Sergeyeva and S.S. Kraynov under the leadership of V.N. Roginskiy and V.G. Lazarev. The circuit analysis of a system consists in determining states of operating components, including their interdependence in time. In practice, this reduces to checking the circuit structure and determining the sequential operation of multi-contact circuits in time. Determination of sequential time operation of components of a multi-contact circuit may be made from the results of structural analysis of its single-contact equivalent. The bloc diagram of the machine designed using this principle is shown in Fig. 2, where B - external disturbance unit, determining the initial state of input components and changes of states of reacting components occurring in the steady-states of the circuit; 3-delay unit, used for simulating delays in operation and release of the circuit components; 0 - feedback unit for transmitting from the output to the input the intermediate component state combinations.

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$$\uparrow \text{B}\Gamma(Y_B(t)) \rightarrow \text{output, M)} M(Y_B(t) \sim Y_M(t)) \downarrow \text{B}\Gamma(Y_M(t) \rightarrow 3)$$

is the logic of the algorithm realized by the machine, for obtaining the table of commutations of a multi-contact switching system. The synthesis of a relay switching arrangement is actually the design of the switching part of the circuit together with, for a multi-contact system, choosing the intermediate relays and their sequence of switching. The design of such a machine was made possible by the graphical method of obtaining the required synthesis algorithm given by V.N. Roginskiy (Ref. 10: Graficheskiy metod postroeniya skhem kontaktnykh (1, k) - polyusnikov (Graphical Method of (1, k)-Pole Switching Network Design). Problemy peredachi informatsii, Izd-vo AN SSSR, 1959). This graphical method lies at the basis of design of the fully automatic machine for synthesis of relay systems. From the conditions of connections between the input and each of two outputs, the machine makes it possible to construct a switching system of two operating circuits, consisting from the contacts of not more than 4 relays. The synthesis conditions are supplied as a set of numbers on a special board. The results of synthesis

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sis are displayed on a light grid. The machine has 204 relays type PKH (RKN). The synthesis time of one variant is about 1 mm. The second model of the machine produces not only the synthesis of the switching system but also the process of checking whether the commutation table can be realized or not, the process of choosing the minimum necessary number of intermediate relays and the process of constructing the commutation table itself. The machine incorporates a counter, automatically consisting of the number of contacts of each relay and the overall number of contacts. There is a safety device included, protecting the machine against the operator's mistake. The second machine has about 1000 relays type RKN and five type ШИ-11 (ShI-11) and ШИ-25 (ShI-25) selectors. The design of a machine for the synthesis of systems with a larger number of relays (9 - 10) is limited by the operating speed and dimensions of the machine. These are the reasons why the electronic variant of the machine is under development at LSPI. A discussion followed in which the following took part: Shcheglovitov (USSR), R.K. Belikov (USSR), B.L. Timofeyev (USSR) and V.D. Kazakov (USSR). There are 5 figures and 13 references: 11 Soviet-bloc and 2 non-Soviet-bloc. The references to the English-language publications read as follows:
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28223

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16.6800

AUTHORS: Lazarev, V.G., and Piyl', Ye.I. (Moscow)

TITLE: A method of synthesizing switching circuits

PERIODICAL: Avtomatika i telemekhanika, v. 22, no. 9, 1961,
1194 - 1201

TEXT: In the present article, the elements of feedback (ЭОС-ЕОС) are considered which produce at the output voltage signals. Conditions when they have to be used are analyzed and their minimum number evaluated for a given set of conditions, and finally a method of synthesizing switching circuits is proposed for the case when feedback elements are used which react to the signals resulting from any transition of the combination of input into any of the output (ЭОС-Б - ЕОС-В) feedback elements of B type. In this case the feedback elements can be switched-in independently of their previous state by signals resulting from a transposition of signals not met before. Let the switching be given by Fig. 1a with

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the following notation: x_i - input signals; z_i - output signals;
— - signal present at main input; — - signal present at the subsidiary input x at the output. Since the output signals result from transitions of certain input conditions into other signals, a definition of these transitions is needed. They are described by voltagepulse formulae introduced by A.D. Talantsev (Ref. 6: Ob analize i sinteze nekotorykh elektricheskikh skhem pri pomoshchi spetsial'nykh logicheskikh operatorov (Analysis and Synthesis of Certain Electric Circuits by Special Logic Operators), Avtomatika i telemekhanika, v. XX, No. 7, 1959) which include 'and' 'or' 'nor' and d transformation circuits. Transitions exist from the 'on' state of input signal into 'zero' and vice versa: $dx(t) = 1$ - transition from 'one' to 'zero' state, $d\bar{x}(t) = 1$ - from zero to one when $dx(t) = 0$ and $d\bar{x}(t) = 0$ - no transition exists. The signals from main outputs have a voltage character and are described by

$$z_1 = \bar{x}_1 \bar{x}_2 \bar{x}_3 \bar{x}_4 \bar{x}_5 \vee \bar{x}_1 \bar{x}_2 \bar{x}_3 \bar{x}_4 x_5 \vee \bar{x}_1 \bar{x}_2 \bar{x}_3 x_4 \bar{x}_5 \vee \bar{x}_1 \bar{x}_2 \bar{x}_3 x_4 x_5 \vee \bar{x}_1 \bar{x}_2 x_3 \bar{x}_4 \bar{x}_5 \vee \bar{x}_1 \bar{x}_2 x_3 \bar{x}_4 x_5 \vee \bar{x}_1 \bar{x}_2 x_3 x_4 \bar{x}_5 \vee \bar{x}_1 \bar{x}_2 x_3 x_4 x_5$$

$$z_2 = \bar{x}_1 \bar{x}_2 \bar{x}_3 x_4 \bar{x}_5 \vee \bar{x}_1 \bar{x}_2 \bar{x}_3 x_4 x_5 \vee \bar{x}_1 \bar{x}_2 x_3 \bar{x}_4 \bar{x}_5 \vee \bar{x}_1 \bar{x}_2 x_3 \bar{x}_4 x_5 \vee \bar{x}_1 \bar{x}_2 x_3 x_4 \bar{x}_5 \vee \bar{x}_1 \bar{x}_2 x_3 x_4 x_5 \vee \bar{x}_1 x_2 \bar{x}_3 \bar{x}_4 \bar{x}_5 \vee \bar{x}_1 x_2 \bar{x}_3 \bar{x}_4 x_5 \vee \bar{x}_1 x_2 \bar{x}_3 x_4 \bar{x}_5 \vee \bar{x}_1 x_2 \bar{x}_3 x_4 x_5 \vee \bar{x}_1 x_2 x_3 \bar{x}_4 \bar{x}_5 \vee \bar{x}_1 x_2 x_3 \bar{x}_4 x_5 \vee \bar{x}_1 x_2 x_3 x_4 \bar{x}_5 \vee \bar{x}_1 x_2 x_3 x_4 x_5$$

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(parameter t being omitted). The signals for switching the EOS-B circuits may be described by boolean functions if function F is found such that $y = dF$, i.e. if a voltage function F exists, whose differentiating produces the required pulse signal. The circuit becomes that shown in Fig. 3 in which all signals, but y , are voltage signals. The process of determining function F is called the integrating of a voltage pulse from y (Ref. 6: Op.cit.). Function F can be obtained directly from operating conditions of the circuit. Function F_3 is given by

$$F_3 = x_1 \bar{x}_2 \bar{x}_3 \bar{x}_4 \bar{x}_5 \vee x_1 x_2 x_3 x_4 \bar{x}_5$$

Its values may thus be produced in the same form as main output signals z and the switching circuit may be designed by the known methods around "and" "or" and "nor" elements. The design procedure in using EOS-B elements is thus as follows: 1) Additional inputs are connected, required for realizing the given conditions of operation; 2) By weighing input signals the absolutely necessary and

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conditional number selections of output signals z are obtained;
3) This determines the absolutely necessary numbers for function F . In general two forms of function F may be obtained; 4) Therefore each form of F both F and z functions are simplified using the conditional numbers, and the circuit is built using "and" "or" or "nor" elements. It is stated in conclusion that the circuit as shown in Fig. 3 is not always possible to realize; since for some voltage-pulse forms, not one but many F functions can be found, whose differential is y . There are 7 figures, and 15 references: 13 Soviet-bloc and 2 non-Soviet-bloc. The references to the English-language publications read as follows: W. Keister, A.E. Ritchie, S.W. Waschburn, The design of switching circuits, N.Y. Van Nostrand, 1951; D.A. Huffman, The synthesis of sequential switching circuits. Journal of the Franklin Inst., v. 257. no. 3, 4. 1954.

SUBMITTED: February 14, 1961

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9,4000 (1159,1139,1161)

25707
S/020/61/139/003/006/025
B104/B201

AUTHORS: Lazarev, V. G., and Piy1', Ye. I.

TITLE: Integrating of potential-pulse shapes

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 139, no. 3, 1961, 556 - 559

TEXT: A description is offered of algebraic methods of integrating potential-pulse shapes, which permit the circuit diagram of the electronic devices concerned to be simplified appreciably. The potential-pulse shapes can be represented as disjunction g of conjunctions of the form

$$\beta_i = x_{i_1}^{p_{i_1}} x_{i_2}^{p_{i_2}} \dots x_{i_{n-1}}^{p_{i_{n-1}}} dx_{i_n}^{p_{i_n}}, \quad Y = \bigvee_{i=1}^g \beta_i \quad (1).$$

Here, $p_i = 0, 1$; $x_i^{p_i} = x_i^{p_i} \vee \bar{x}_i^{1-p_i}$; $g \leq 2^n$. These conjunctions are designated as unconditional if $Y = 1$ is satisfied. If $Y = 0$ they are called forbidden conjunctions. Such for which Y is undefined are designated as conditional conjunctions. Taking account of the latter enables one to simplify the electronics in a number of cases. The

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integration method described here proves the most effective in cases, where a large number of conditional conjunctions appear. A potential-pulse shape is said to be integrable if it is possible to indicate a Boolean function $F(x_1, \dots, x_n)$ such that $dF = Y(2)$. F , like any Boolean function, can be defined by a great number of constituents, by which F assumes the value 1. They are called unconditional constituents. Such as assign F the value 0 are termed forbidden constituents, and such in which F is not defined are designated as conditional constituents. Conjunction

$\alpha_i = x_{i_1}^{p_{i1}} \dots x_{i_n}^{p_{in}}$ is an unconditional constituent of function F , and conjunction $\alpha'_i = x_{i_1}^{p_{i1}} \dots x_{i_r}^{\bar{p}_{ir}} \dots x_{i_n}^{p_{in}}$ is a forbidden conjunction.

Both constituents are designated as a pair of constituents and denoted by

$A_i = \begin{pmatrix} \alpha_i \\ \alpha'_i \end{pmatrix}$. Each of the conjunctions of an integrable potential-pulse

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shape defines a pair of constituents for the function F . The potential-pulse shape is defined as a system of constituent pairs, which is denoted by $[Y] = [A_{i_1}, \dots, A_{i_n}]$. The totality of forbidden conjunctions defines

a system of sets of constituents, which may be represented in the form $|Y| = |B_{j_1}, \dots, B_{j_s}|$. The system $\{Y\} = \{A_{i_1}, \dots, A_{i_n}, B_{j_1}, \dots, B_{j_h}\}$

is defined as a general system of pairs and sets. If, in this general system, one of the unconditional constituents does not appear among the forbidden ones, this system is said to be coordinate. Otherwise, this general system can be divided into coordinate subsystems, and the general system will be partially coordinate. To each of these subsystems there corresponds a function F^j . A potential-pulse shape (1) is designated as

being partially integrable if $\bigvee_{j=1}^m dF^j = Y(3)$. If no function F can be

found to satisfy (2) or (3), this potential-pulse shape will be not integrable. The following theorems are formulated: Theorem 1: A potential-pulse shape is integrable if a coordinate general system of Card $3/4$

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pairs and sets of constituents corresponds to it. Theorem 2: A potential-pulse shape is partially integrable if a partially coordinate general system of pairs and sets of constituents corresponds to it. Theorem 3: A potential-pulse shape is not integrable if an absolutely noncoordinate general system of pairs and sets of constituents corresponds to it. Two examples are finally discussed. It is assumed in them that, if no forbidden conjunctions appear, all the others are conditional conjunctions, with the exception of those defining the potential-pulse shape. In this case there is no system of sets of constituents, and the general system of pairs and sets will agree with the system of pairs of constituents. A. D. Talantsev is mentioned. M. L. Tsetlin is thanked for interest displayed and advice given. There are 3 Soviet-bloc references.

PRESENTED: February 23, 1961, by B. N. Petrov, Academician

SUBMITTED: February 22, 1961

Card 4/4

LAZAREV, V. G. and PIYL, Ye. I.

"Reduction of member of internal states in certain classes of finite automata"

report submitted for the Intl. Symposium on Relay Systems and Finite Automata Theory (IFAC), Moscow, 24 Sep-2 Oct 1962.

LAZAREV, V.G. (Moskva); PIYL', Ye.I. (Moskva)

Method for obtaining a complex algorithm by joining simple algorithms. Izv. AN SSSR. Otd. tekhn. nauk. Energ. i avtom. no.3: 189-195 My-Je '62. (MIRA 15:6)
(Machine translating) (Information theory)

LAZAREV, V.G. (Moskva); PIYL', Ye.I. (Moskva)

Certain classes of finite automats. Zhur.vych.mat.i mat.fiz.
2 no.4:695-702 JI-Ag '62. (MIRA 15:8)
(Automation)

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S/103/62/023/008/002/006
D409/D301

1 1 0 (2403)

AUTHORS:

Lazarev, V.G. and Pyl', Ye.I. (Moscow)

TITLE:

Method of synthesis of finite automata (sequential circuits) with pulse-potential feedback elements

PERIODICAL:

Avtomatika i telemekhanika, v. 23, no. 8, 1962,
1037 - 1043

TEXT:

A method of synthesis of sequential circuits is proposed, based on Huffman's transition tables and the use of pulse-potential feedback elements; the latter is described in an earlier work by the authors. The number of rows of Huffman's tables is further reduced and a tabular method of integrating the pulse-potential forms is considered. The proposed method of synthesis of sequential circuits involves the following steps: 1) The transition tables are contracted by Huffman's method; 2) The tables are further contracted by using pulse-potential feedback elements, i.e. all the unstable states are replaced by stable states (by introducing new notations in the tables); thereby groups of similar stable states appear in the table. From each

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D409/D301

Method of synthesis of finite ...

of the groups it is possible to eliminate some of the states; the new sequential circuit obtained is equivalent to the original sequential circuit: 3) Each row of the contracted table is made to correspond to a certain combination of states of the feedback elements: 4) The Boolean functions for the output signals, determining the output states, are written down: 5) The pulse-potential form for each additional output signal is written down (these forms can be directly obtained from the tables): 6) The pulse-potential forms are integrated, i.e. a Boolean function F is sought, so that

$$Y = dF, \quad (1)$$

or, in the case of m Boolean functions F^j :

$$Y = \bigvee_{j=1}^m dF^j. \quad (2)$$

Each of the conjunctions of Y determines a pair of components of F corresponding to 0 and 1, respectively). The system of components of F , for which the latter assumes one and the same value, is called the system

Card 2/3

16.6800

36908
S/020/62/143/005/004/018
B104/B102

AUTHORS: Lazarev, V. G., and PiyI', Ye. I.

TITLE: Reduction of the number of states of one class of finite automations

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 5, 1962, 1064-1066

TEXT: Automations described by

$$\begin{aligned}\chi(p+1) &= \psi\{\mu(p-1)\} = \psi\{d[q(p-1); \chi(p-1)]\}; \\ \lambda(p) &= \Gamma[q(p); \chi(p)]\end{aligned}$$

are investigated. $\chi(p)$ is the inner state of the automaton, $\lambda(p)$ is the output state, $q(p)$ is the input state, p is the time interval corresponding to the period T of an automaton cycle, d is a transition operator describing the variation in state of the automaton, $d[\mu(p-1)]$ denotes the variation in state of the automaton during its transition from cycle $p-1$ to cycle p . The description of the operation of an asynchronous automaton by means of a transition matrix is studied (D. D. Aufenkamp,

Card (1/2)

S/020/62/143/005/004/018
B104/B102

Reduction of the number of...

F. E. Hohn, Trans. IRE, Prof. Group on EC, 6, no. 4 (1957)). The variable quantity T is determined by the input state. The period of transition from one state to another is assumed to be smaller than T . The transition matrix is reduced by D. D. Aufenkamp's method (Trans. IRE, Prof. Group on EC, 7, no. 4 (1958)). The new matrix describes an automaton which is equivalent to the original one; but has a minimum number of inner states. ✓

ASSOCIATION: Institut problem peredachi informatsii Akademii nauk SSSR
(Institute of Information Transmission Problems of the
Academy of Sciences USSR)

PRESENTED: October 19, 1961, by B. N. Petrov, Academician

SUBMITTED: October 12, 1961

Card (2/2)

L 11127-63

EWI(d)/FCC(w)/BDS AFFAC IJP(C)

ACCESSION NR: AT3001255

S/0562/63/000/012/0039/0052

AUTHOR: Lazarev, V. G.; Piyl', Ye. I.

TITLE: Determination of the number of inner states for one class of finite automata

SOURCE: AN SSSR. Inst. problem peredachi informatsii. Problemy* peredachi informatsii, no. 12, 1963, 39-52

TOPIC TAGS: synthesis of finite automata, minimal-state automata, minimization problem

ABSTRACT: The synthesis of one class of ¹⁶finite automata, the behavior of which is described by the equations:

$$\lambda(p) = \Gamma \{ \kappa(p), \rho(p) \}.$$

$$\kappa(p + 1) = \Phi \{ d[\mu(p - 1)] \} = \Phi \{ d[\rho(p - 1), \kappa(p - 1)] \}, \quad (1)$$

where $\kappa(p)$ is the inner state of the automaton, $\rho(p)$ is the input state, $\lambda(p)$ is the output state, p is the interval of time defined by the state of an automaton,

Card 1/3

L 11127-63

ACCESSION NR: AT3001255

and $d[\mu(p - 1)]$ is an operator describing the change in the state of an automaton during passage from the interval $p - 1$ to the interval p , has been studied. It is noted that for the realization of such automata, feedback elements must be used which respond to the pulse signals formed by the transition of the automaton from one state into another (thyatron, various triggers, etc.). It is shown that, in a series of cases, such automata can be realized with a smaller number of inner states than automata described by the equations:

$$\kappa(p + 1) = \Phi\{\kappa(p), \rho(p)\},$$

$$\lambda(p) = \Gamma\{\kappa(p), \rho(p)\}$$

(2)

under the same operating conditions. Methods for reducing the number of states of finite automata described by equations (1) are presented for cases in which operating conditions of automata are defined by 1) tables of switchings, 2) tables of transitions (Huffman tables), and 3) transition matrices. This article was reported in a seminar of the Institut problem peredachi informatsii Akademii nauk SSSR (Institute of the Problems of Information Transmission, Academy of Sciences, SSSR) 10 Dec 1960 and 10 Jun 1961. Orig. art. has: 3 figures, 5 formulas, and 3 tables.

Card 2/3

ACCESSION NR: AT4008640

S/2945/63/000/015/0005/0012

AUTHOR: Lazarev, V. G.

TITLE: Development of control system for the information transmission and distribution networks

SOURCE: AN SSSR. Institut problem peredachi informatsii. Problemy* peredachi informatsii, no. 15, 1963. Sistemy* raspredeleniya informatsii. Opozvaniye obrazov, 5-12

TOPIC TAGS: information transmission, information distribution, communication network, transmission control system, distribution control system, connection control, telephony, call handling control, connection optimal control, computer controlled call, connection control programming, automatic control system, control algorithm, programmed information transmission

ABSTRACT: In order to ensure optimal service to the subscribers of

Card 1/3

ACCESSION NR: AT4008640.

an information transmission and distribution network (such as a telephone system, a system serviced by a computer, and others) under varying load conditions, several types of system control units are proposed, which analyze the existing situation (for example, by means of a special-purpose digital computer) and select the optimal system interconnections to cope with the situation. Two basic control units are considered, with decentralized and centralized functional interconnections. It is shown that with a centralized multi-program control system it is possible to organize the control of a network for the transmission and distribution of information in a flexible manner in such a way that the communication channels, the switching equipment, and the control units themselves are used where necessary, and this optimizes the degree of utilization of the system equipment. Orig. art. has: 6 figures.

ASSOCIATION: Institut problem peredachi informatsii AN SSSR (Institute of Information Transmission Problems AN SSSR)

Card 2/3

ACCESSION NR: AT4008640

SUBMITTED: CO

DATE ACQ: 23Jan64

ENCL: 00

SUB CODE: CP, CO

NO REF SOV: 013

OTHER: 006

Card 3/3

ACCESSION NR: AT4008642

S/2945/63/000/015/0023/0035

AUTHORS: Lazarev, V. G.; Piy'l', Ye. I.

TITLE: Methods for construction of a programmed control block in a control system

SOURCE: AN SSSR. Institut problem peredachi informatsii. Problemy* peredachi informatsii, no. 15, 1963. Sistemy* raspredeleniya informatsii. Opoznaniiye obrazov, 23-35

TOPIC TAGS: programmed control block, control block construction, control system, block asynchronous operation, block synchronous operation, finite automatic system, functional block, algorithm logic circuit, Mealy automaton, Mur automaton, asynchronous operation mode, synchronous operation mode, coding control, sequential logic network

ABSTRACT: Methods are considered for the construction of a program

Card 1/3

ACCESSION NR: AT4008642

control block, which determines the sequence with which functional blocks of an information distribution system are to operate in order to service the incoming calls in accordance with a specified algorithm. The program control block issues control signals which initiate operation of the functional block. At the end of the operation, the functional block generates a signal fed back to the program control unit, following which the latter can issue the next control signal. The Lyapunov algorithm logic circuit (Problemy kibernetiki, No. 1, Fizmatgiz, 1958) is used to describe the sequence of the program control block signals. The case of realization of a single algorithm and of several algorithms whose sequence depends on various parameters is considered in detail. Realization of the program control block by means of both Mealy and Moore automata is discussed. It is shown that synchronous and asynchronous operating modes of the programmed control block are approximately equivalent with respect to the number of elements necessary to synthesize the system. The asynchronous operating mode has the advantage that it permits more ef-

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ACCESSION NR: AT4008642

fective utilization of the operating speed of the control block, but may cause some complications in the functional blocks, owing to the need of generating signals that indicate the termination of their operation. Consequently, the choice of the program control block used for a specific automatic system depends primarily on the concrete operating conditions of the control block. Orig. art. has: 5 figures, 16 formulas, and 8 tables.

ASSOCIATION: Institut problem peredachi informatsii AN SSSR (Institute of Information Transmission Problems AN SSSR)

SUBMITTED: 00

DATE ACQ: 23Jan64

ENCL: 00

SUB CODE: MM,CO

NO REF SOV: 005

OTHER: 003

Card 3/3

LAZAREV, V.G.; PIYL', Ye.I.

Determination of the number of internal states in a certain
class of finite automata. Probl. persi. inform. no. 10, 32-42
'63.

Methods for integrating potential-pulse forms. Ibid.: 70-84
(MIRA 17:10)

LAZAREV, V.G.; NAUMCHUK, G.F.; SAVVIN, G.G.; SEMENOVICH, Ye. .

Transcription of standard automatic telephony unit with 10 lines.
Probl. period. inform. no. 11:20-24 1963.

1963 11:10

S/103/63/024/002/017/020
D201/D308

AUTHORS: Lazareva V.G. and Piyl', Ye.I. (Moscow)
TITLE: Simplification of pulse-potential forms
PERIODICAL: Avtomatika i telemekhanika, v. 24, no. 2, 1963,
271-276

TEXT: The authors describe a simplification of pulse-potential forms by separating common factors from adjacent homogeneous conjunctions. The simplification is carried out in two stages: in the first stage the simplifications are based on the use of absolutely homogeneous conjunctions, leading to the elimination of variables and in the second stage they are related to introduce the D-operator.

SUBMITTED: January 4, 1962

Card 1/1

IVANOVA, Ol'ga Nikolayevna; LAZAREV, Vladimir Georgiyevich;
PIYL', Yelena Ivanovna; MARKHAY, Ye.V., prof., stv. red.;
VOLKOVA, E.M., red.

[Synthesis of electronic circuits with discrete action]
Sintez elektronnykh skhem diskretnogo deistviia. Moskva,
Izd-vo "Sviaz'," 1964. 175 p. (MIRA 17:5)

L 55152-65

EWI(d)/EWI(1)/EWP(v)/EWP(k)/EWP(h)/EWA(h)/EWP(1)

Pf-4/Pet

ACCESSION NR AM5000996

BOOK EXPLOITATION

S/

Lazarev, V. G.; Pyl', YE. I.

Synthesis of asynchronous terminal automatic devices (Sintez asinkhronnykh konechnykh avtomatov), Moscow, Izd-vo "Nauka", 1964, 256 p. illus., biblio. Errata slip inserted. 2,800 copies printed. (At head of title: Akademiya nauk SSSR. Institut problem peredachi informatsii)

TOPIC TAGS: circuit theory, ²⁵sequence switch, relay system, automatic control, ¹⁴canonic equation, logic circuit

TABLE OF CONTENTS (abridged):

Foreword -- 3

Introduction -- 5

Ch. I. Definition of the classes of finite automatic machines -- 12

Ch. II. Minimization of the number of internal states of asynchronous finite automatic machines -- 38

Ch. III. Obtaining canonic equations -- 164

Ch. IV. Synthesis of a logic converter of an automatic machine -- 207

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Card 1/2

L 55152-65
ACCESSION NR AM5000996

SUBMITTED: 02Jul64

SUB CODE: TP, EC

NO REF SOV: 088

OTHER: 032

Card 2/2

ACCESSION NR: AT4042437

S/0000/64/000/000/0059/0066

AUTHOR: Zenchenko, V. P.; Lazarev, V. G.; Plyl', Ye. I.

TITLE: Synthesis of pneumatic systems with track control using transition operations

SOURCE: Vsesoyuznoye soveshchaniye po pnevmo-gidravlicheskoj avtomatike. 5th, Leningrad, 1962. Pnevmo- i gidroavtomatika (Pneumatic and hydraulic control); materialy* soveshchaniya, Moscow, Izd-vo Nauka, 1964, 59-66

TOPIC TAGS: automation, automatic control system, pneumatic control system, track control, transition operation, cyclogram, control system design

ABSTRACT: In an earlier paper by the first author (V. P. Zenchenko. Strukturnyy metod postroyeniya pnevmaticheskikh sistem s putevym kontrolem. Stanki i instrument, 1962, No. 4), a method was proposed for the synthesis of pneumatic systems with track control based on devices which realized the operations AND, OR, NOT, and MEMORY, and which allowed one to obtain dynamically stable systems. In the present paper, the authors start with a discussion of the transition operations. The cyclograms of a machine for crimping covers and of a loading device are illustrated by way of example. They then show how to eliminate the coincidence of the stages and how to simplify the pulse-potential forms. Using the method

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ACCESSION NR: AT4042437

proposed in this paper, systems can be designed which contain considerably fewer components as compared with those designed by the method of the earlier paper. Also, the systems which are designed by the present method are efficient for the determination of dynamic conditions whose variation can require occasional debugging. Orig. art. has: 5 figures and numerous formulas.

ASSOCIATION: none

SUBMITTED: 29Jan64

SUB CODE: IE

NO REF SOV: 005

ENCL: 00

OTHER: 000

Card 1 2/2

LAZAREV, V.G.

(Moskva)

Matrix method for minimizing the number of internal states of
asynchronous finite automata. Izv. AN SSSR Tekh. kib. no. 1:
36-38 Ja-F'64 (MIRA 17:8)

L 28754-65 EWT(d)/EWT(1)/EWP(c)/EWA(d)/EWP(v)/T/EWP(k)/EWP(h)/EWP(1)/EWA(h)
Pf-4/Feb GG

ACCESSION NR: AT5003306

S/2950/64/000/003/0063/0066

AUTHOR: Lazarev, V. G.

TITLE: A machine for the synthesis of relay switching circuits

SOURCE: EIKA, entskilopediya izmereniy, kontrolya i avtomatizatsii (Encyclopedia of measurement, control and automation), no. 3. Moscow, Izd-vo Energiya, 1964, 63-66

TOPIC TAGS: relay circuit, relay switching circuit, circuit design, relay system synthesis, switching circuit synthesis

ABSTRACT: Because of the multiplicity of possible solutions in the synthesis of switching circuits it is very difficult to obtain an optimum configuration, i.e. one that has a minimum number of relays and switches. A machine approach to this problem is therefore desirable. The Institut problem peredachi informatsii AN SSSR (Institute of information transmission problems) first developed such a machine in 1956-1957. This machine could synthesize switching circuits with one input and k outputs and display any of the $n!$ varieties of the circuit (n = number of relays) for $2k2^n$ conditions on a visual display in schematic form. The Institut avtomatiki i telemekhaniki (Institute of automation and remote control) constructed

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L 28754-65

ACCESSION NR: AT5003306

this type of machine for $k = 2$ in 1958. Its principle of operation was based on the graphical method of synthesis of switching circuits, described by V. N. Roginskiy (Probl. peredachi informatsii, 1, 1959, pp. 5-40). For $k = 2$ and $n = 4$ the machine contained 204 relays and required 1 minute to synthesize one version of the circuit. In 1957-1959, the Institute developed an improved version of this machine. The new model allowed an automatic verification of the circuit realizability and minimum number of relays required to obtain a realizable circuit from nonrealizable conditions. The processing algorithm for this machine was given by V. G. Lazarev (Sb. nauchn. rabot po provodu svyazi, 5, 1956, pp. 93-103). The display could not accommodate all of the 2^{2n} conditions and only simpler versions could be synthesized. This caused the display dimensions to vary linearly with n instead of exponentially, as in the first model. In 1960, the Institute designed a completely electronic version of this machine. The new design permitted the synthesis of all 2^4 ($n = 4$) versions of the circuit in just 1 second. The block diagrams and the description of operation of all of these machines are given in the article. Orig. art. has: 6 figures.

ASSOCIATION: Institut problem peredachi informatsii AN SSSR, Moscow (Information transmission problems institute, AN SSSR)

SUBMITTED: 00
NO REF SOV: 017
Card 1/2

ENCL: 00
OTHER: 002

SUB CODE: EC

L 24508-65 ASD(a)-F/ESD(c)/ESD(dp)

AM4046246

BOOK EXPLOITATION

S

Ivanova, Ol'ga Nikolayevna; Lazarev, Vladimir Georgiyevich; Piy1', Yelena Ivanovna

B+1

Synthesis of electronic circuits with discrete action (Sintez elektronnykh skhem diskretnogo deyatviya) Moscow Izd-vo Svyaz, 1964. 175 p. illus., biblio. 6100 copies printed. Responsible editor: Ye. V. Markhay; Editor: E. M. Volkova; Technical editor: L. A. Trishina; Proofreader: F. A. Shtromberg

TOPIC TAGS: discrete action electronic circuit, algebra of logic, potential circuit, potential pulse circuit, diode circuit, transistor circuit, circuit theory, telephony, equipotential function, Boolean function

PURPOSE AND COVERAGE: This book is intended for students and aspirants in communications institutes and for engineers working in the field of electronic discrete-action devices. Some methods of synthesizing the structures of electronic discrete-action devices are described. In this, certain concepts are given from the algebra of logic that are applied in the methods analyzed, as well as methods of synthesizing potential and potential-pulse circuits and methods of

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L 24508-65

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the electrical design of operators that carry out the basic operations of the algebra of logic. Only the minimum information necessary to designers for constructing circuits by the methods of circuit theory are presented, beginning with the presentation of conditions and ending with the construction of the functional circuit and its electrical design. The electrical designing is performed only for diode and transistor circuits. This textbook is written on the assumption that the reader is acquainted with the fundamentals of circuit theory from a course in telephony. The authors express their gratitude to Professor Ye. V. Markhay and also to Candidates of Technical Sciences Z. S. Kokhanov and G. G. Savvin.

TABLE OF CONTENTS:

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Ch. I. Basic concepts and laws of the algebra of logic - - 5

Ch. II. Application of the apparatus of the algebra of logic for describing electronic circuits - - 50

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Ch. IV. Synthesis of potential circuits - - 99
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SUB CODE: EC

SUBMITTED: 14Apr64

NR REF SOV:020

OTHER:010

Card 3/3

I 58551-65 EWI(d)/EED-2/EWP(1) Pq-4/Pg-4/Pk-4 LJP(c) BB/GG
ACCESSION NR: AP5012874 UR/0280/65/000/002/0035/0042

AUTHOR: Lazarev, V. G. (Moscow)

37
B

TITLE: Matrix method of minimization of microprogram flow charts

SOURCE: AN SSSR. Izvestiya. Tekhnicheskaya kibernetika, no. 2, 1965, 35-42

TOPIC TAGS: computer microprogram, digital computer

ABSTRACT: A new method is suggested for transforming and simplifying microprograms (used in digital computers, dial telephone systems, etc.) in which the microprograms are described by logical diagrams of algorithms (LDA); external micro-operations of the microprograms are represented by LDA operators, and internal micro-operations, by logical conditions (LC) of LDA. Thus, the rules of transformation and simplification of LDA become applicable to microprograms: the LDA's can be simplified by reducing the number of entrances of LC. If, however, an LDA has a number of entrances of the same operator, they are

Card 1/2

L 58551-65

ACCESSION NR: AP5012874

considered as different operators. In the author's LDA minimization method, the matrix diagram of algorithm corresponding to a specified LDA is interpreted as a matrix of states of an automaton which realizes this LDA. A nonrigorous equivalence between automata is tolerated which permits combining various operators (and LC's) into one complex operator (and LC); thus, various micro-operations which can be performed simultaneously are combined into one micro-command. Orig. art. has: 12 formulas and 2 tables.

ASSOCIATION: none

SUBMITTED: 17Apr64

ENCL: 00

SUB CODE: DP

NO REF SOV: 010

OTHER: 001

Card 2/2 *amp*

BUTRIMENKO, A.V.; LAZAREV, V.G.

Stochastic systems to get optimum routes. Probl. pered. inform. 1 no.1:
80-87 '65. (MIRA 18:7)

LAZAREV, V.G.

Synthesis of microprogram automata. Probl. pered. inform. 1 no.2:63-78
'65. (MIRA 18:7)

L 8801-66 EWT(d) IJP(c)

ACC NR: AP5026968

SOURCE CODE: UR/0103/65/026/010/1838/1844

AUTHOR: Lazarev, V. G. (Moscow)

ORG: None

TITLE: A method for minimizing the logic circuit of an algorithm

SOURCE: Avtomatika i telemekhanika, v. 26, no. 10, 1965, 1838-1844

TOPIC TAGS: logic circuit, algorithm, minimization, finite automaton, switching theory

ABSTRACT: The author examines one of the possible interpretations of an algorithmic logic circuit in terms of a finite automaton in order to use methods for minimizing the number of states in the automaton to reduce the number of its elements to a minimum (both logical conditions and operators). It is shown that a minimized partial automaton may be constructed which simulates an algorithm for a logic element. It is proved that the number of internal states in this class of automata is a minimum. A method is proposed for minimizing an algorithmic logic circuit based on reducing the number of entries of logic conditions when there are no iterative operators. This method may be extended to circuits containing identical operators where the number of entries of operators into the circuit is also minimized. Orig. art. has: 3 figures, 3 tables.

SUB CODE: 09 / SUBM DATE: 05Aug64 / ORIG REF: 010 / OTH REF: 005

jw

Card 1/1

UDC 62-50

ACC NR: AP6007533

SOURCE CODE: UR/0406/65/001/002/0063/0078

AUTHOR: Lazarev, V. G.

ORG: none

TITLE: The synthesis of microprogrammed automata

SOURCE: Problemy peredachi informatsii, v. 1, no. 2, 1965, 63-78

TOPIC TAGS: automaton, algorithmic language, computer programming

ABSTRACT: The concept of the 2nd-order microprogram automaton (MA) is defined and a class of such automata is determined, which includes such various forms of autonomous automata as a central (programmed) control unit for a wide variety of control apparatus for information distribution systems, digital computer microprogram control units, etc. An autonomous MA (i.e., an automaton which can have only one input state R) is analyzed, with its working conditions described through the use of algorithmic language, previously proposed as a programming tool. The nature and scope of the algorithmic language are defined, and it is shown how an algorithm for the abstract synthesis of an autonomous MA may be formulated on the basis of this language. State transition tables are analyzed for various versions of logical algorithm languages in order to illustrate the simplification of the language (i.e., the

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UDC: 62-507

ACC NR: AP6007533

realization of an automaton with the least number of internal states) which is a necessary prior condition to the transition to a standard language defining the automaton. A matrix method, based on the compression of the automaton state matrix, is proposed, whereby it is possible to combine identical operators present in the different algorithmic languages. It is shown, on the one hand, that the employment of logical algorithm arrangements as the language used to define that specific class of automata, referred to as microprogrammed automata, provides a convenient and compact method of writing down the working conditions of these automata, whereas the existence of formal techniques for the conversion and minimization of the arrangements permits the achievement of optimal solutions as early as in the first stage of automaton synthesis (the abstract synthesis stage). On the other hand, the interpretation of the logical algorithm arrangements as a finite automaton makes possible, in some cases, the effective use of automaton theory methods when converting the arrangements themselves, particularly when minimizing the microprograms. In conclusion, the author expresses his gratitude to O. P. Kuznetsov for advice and assistance. Orig. art. has: 5 formulas, 5 tables, and 8 figures.

SOURCE CODE: 09/ SUBM DATE: 25Jul64/ ORIG REF: 019

Card

2/2-10

L 05671-67 EWP(1)/EWT(d) IJP(c) GG/BB

ACC NR: AR6023253

SOURCE CODE: UR/0044/66/000/003/V077/V077

AUTHOR: Bukhgol'ts, N. V.; D'yachenko, V. F.; Lazarev, V. G.; Chernyshev, K. K.; Sharov, V. A.

REF SOURCE: Sb. Vychisl. sistemy. Vyp. 18. Novosibirsk, 1965, 119-137

TITLE: On the problem of economy of a computer operating memory 16C

SOURCE: Ref. zh. Matematika, Abs. 3V371

TOPIC TAGS: computer memory, computer programming, computer storage device

TRANSLATION: An application for computer storage of programs and constants used for the automatic control of a constant memory makes it possible to decrease the volume of the operating memory. The problem is solved without introducing changes in the program to find an image of the set of program variables in its field of operation such that the number of operating cells is a minimum. To construct this image, a space-time diagram is made up of traces of variables and their projections, making it possible to combine the addresses of different variables. Theorems are proved on the minimum number of addresses of variables in the program. A block diagram for the program of minimizing the number of memory cells is given. Offered as an example is a program for the computation of square roots requiring five operating cells. A programmer of average

UDC: 681.142.001:51

Card 1/2

L 05671-67

ACC NR: AR6023253

skill used 8 cells. The method set forth here is applicable to ready-made programs, in systems of automatic programming, and in the design of specialized computers. 6 figures, 10 references. Yu. M.

SUB CODE: 09/ SUBM DATE: none

M
Card 2/2

RABICHEVA, L.M.; SLONIMSKIY, B.I.; LAZAREV, V.I.; ALYUSHIN, Ye.I.;
POLETAYEV, G.S.; Prinimali uchastiye: TARASOV, Ye.I.;
AFONIN, P.I.; SYROVEGINA, K.V., nauchnyy sotrudnik.

Electrothermal method of obtaining zinc dust. Sbor. nauch.
trud. Gintsvetmeta no.18:165-174 '61. (MIRA 16:7)

1. Nachal'nik elektrotermicheskoy ustanovki Belovskogo tsinkovogo zavoda (for Tarasov).
2. Starshiy master elektrotermicheskoy opytной ustanovki Belovskogo tsinkovogo zavoda (for Afonin).
3. Gosudarstvennyy nauchno-issledovatel'skiy institut tsvetnykh metallov (for Syrovegina).
(Zinc—Electrometallurgy)

LAZAREV, V.I.

Ionizing radiation and the heating up of the upper atmosphere.
Geomag. i aer. 3 no.5:841-849 S-0 '63. (MIRA 16:11)

1. Institut prikladnoy geofiziki AN SSSR.

OKOL'NICHNIKOV, Yu.D., arkhitekt; LAZAREV, V.I., agronom-ekonomist

Determining the size of rural settlements for the purpose of drawing up a scheme of district planning and designs for the reconstruction of villages. Izv.ASiA 4 no.1:38-46 '62.

(MIRA 15:11)

(Rural planning)

LAZAREV, V.I.
6(5)

PHASE I BOOK EXPLOITATION

SOV/1930

Moscow. Vsesoyuznyy nauchno-issledovatel'skiy institut zvukozapisi

Trudy...Vyp. 2. (Transactions of the All-Union Sound-recording Scientific Institute) Nr 2. Moscow, 1957. 164 p. Errata slip inserted. 1,000 copies printed.

Editorial Board: L.P. Apollonova, V.S. Vaymboym, D.P. Vasilevskiy, A.A. Vroblevskiy, S.A. Gribkova, L.G. Grigorash, B.Ya. Kaznachey, V.I. Parkhomenko, L.A. Pusset, Ye.I. Regirer, M.A. Rozenblat; Tech. Ed.: S.A. Gribkova.

PURPOSE: This collection of articles may be useful to scientists, engineers, specialists, and technicians dealing with sound-recording techniques.

COVERAGE: The articles are the results of research carried out at VNAIZ in 1954-1955. Most of the articles deal with magnetic recording, both for the recording of sound as well as for fixing various physical processes on tape, wire, disc, or drum. References appear separately after each article.

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Transactions of the All-Union (Cont.)

SOV/1930

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Foreword

3

Eliasberg, I.I. The Present State and Possibilities of
Improving Coated Magnetic Tapes

5

The author surveys the present state of modern magnetic tapes with regard to their characteristics and requirements and discusses the possibilities of their improvement. Special attention is devoted to a description of coating powders. There are 21 references: 5 Soviet, 10 English, 4 French, and 2 German.

Vaymboym, V.S. Ways of Increasing the Dynamic Range of a
Sound-Reproduction Amplifier (Playback) for a High-fidelity
Magnetic Tape Recorder

23

The author discusses the basic methods of increasing the dynamic range of playback amplifiers and explains diagrams, basic characteristics, and results of investigation of an amplifier designed by himself. There are no references.

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Transactions of the All-Union (Cont.)

SOV/1930

Parkhomenko, V.I. Magnetic Playback Head

42

The author explains the theory of magnetic modulations in a playback head based on the principle of frequency doubling. He illustrates the article by a description of equipment developed by VNAIZ for reproduction of code pulses at a lower speed of the tape mechanism. There are no references.

Pusset, L.A. Investigation of the Reproduction Process of Magnetic Sound Recording

56

The article describes a theoretical investigation of the reproduction process of sound recorded on any magnetic carrier. There are 2 references: 1 German, and 1 English.

Lazarev, V.I. Some Characteristics of Contactless Magnetic Recording of Sinusoidal Voltages

71

The author reports the results of his experimental investigation of contactless magnetic recording on a drum. He also explains the method he used to reduce the parasitic amplitude modulation of recorded pulses caused by the eccentricity of the drum side-wall. A description is given of the

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Transactions of the All-Union (Cont.)

SOV/1930

MIZ-28 magnetic sound recorder. There are 2 references:
1 Soviet, and 1 English.

Kotlyarevskaya, L.G. Magnetic Discs

79

In connection with the NDD-54 dictaphone developed by VNAIZ, research and development work was carried out at the Institute on magnetic discs. The author discusses in detail the production of magnetic discs. She thanks Candidate of Technical Sciences P.M. Kozlov and Senior Scientific Worker N.A. Trifonova for their assistance. There are 14 references: 8 English, 3 German, 1 Polish, 1 Indian, and 1 Soviet.

Smirnov, V.S. The NDD-54 Disc-type Dictaphone

87

The article briefly describes the NDD-54 dictaphone (VNAIZ), used for sound recording on magnetic discs. The author lists the basic technical characteristics of this equipment. There are no references.

Smirnov, V.S. A Contact Copying Machine for Mass-copy MKTM-1 Magnetic Tape Recorders

90

This magnetic tape-copying machine was developed by VNAIZ, and after a long period of production it was redesigned and modernized to secure a mass production of high-quality magnetic tape copies. There are no references.

Card 4/7

Transactions of the All-Union (Cont.)

SOV/1930

Gol'dberg, G.A., and S.V. Shul'gin. Magnetic Reverberation Chamber

93

The authors explain the basic methods of obtaining the reverberation effect by magnetic tape recording. They list the main characteristics of the reverberator designed and developed by VNAIZ, which is now successfully being employed in many organizations. At present the Institute is developing a new model of a remote controlled magnetic reverberator for lot production. There are 28 references: 12 English, 8 Soviet, 5 German, 2 French, and 1 Hungarian.

Langen, A.M., and M.A. Onatsevich. Investigation of External Electromagnetic Stray Fields Caused by Electric Motors in Sound Recording Equipment

122

The authors discuss special problems of design, selection, and application of electric motors of various types for sound recording equipment. They investigate the methods used for eliminating the effects of a-c electromagnetic stray fields. Materials concerning the effects of d-c electromagnetic stray fields will be published later. There are 4 Soviet references.

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Transactions of the All-Union (Cont.)

SOV/1930

Langen, A.M. On the Problem of Selecting the Type and Parameters of the Drive Motor for a Three-motor Broadcast Tape Recorder

131

The author lists and discusses the requirements of the drive motor. His article is a continuation of the previous article. There are no references.

Langen, A.M. Two-speed Synchronous Drive Motor for a Broadcast Tape Recorder

143

The author provides technical specifications and recommendations on the selection of a two-speed motor. There are no references.

Rezvyakova, Z.N. On the Audibility of Distortions of a Short Tone

149

The author reports on the results of investigation of the audibility of nonlinear distortions caused chiefly by overmodulation in recording. She also discusses the effect of distortion level and its duration on audibility. There are 5 references: 2 Soviet, 2 German, and 1 English.

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Transactions of the All-Union (Cont.)

SOV/1930

Simonov, I.D., and S.G. Korsunskiy. Call Signal Apparatus 157

The authors explain the operating principle and basic characteristics of a tuning-fork call-signal apparatus designed and developed by VNAIZ. They refer to a mechanical call-signal apparatus designed by V.T. Mal'tsev and discuss the advantages of the new apparatus, which is basically an automatic musical instrument. There are 6 references: 3 Soviet, 2 English, and 1 German.

AVAILABLE: Library of Congress

JP/ad
8-26-59

Card 7/7

LAZAREV, V.I.

Method for evaluating changes in the time scale in the playback
of magnetic recordings. Trudy VNAIZ no.7:4-17 '60. (MIRA 14:4)
(Magnetic recorders and recording)

LAZAROV, V.I.

Automatic system for controlling the average speed of the tape of
a television video tape recording system. Trudy VNAIZ no.9:3-21
'61. (MIRA 15:9)

(Video tape recorders and recording)

LAZAREV, V.I.

Investigating efficient waste land cultivation practices for the
Ob Plateau of Novosibirsk Province. Trudy Biol. inst. Zap.-Sib.
fil. AN SSSR no.3:117-125 '57. (MIRA 13:10)
(Novosibirsk Province--Tillage)

MONAKHOV, N.I., inzh., glavnyy red.; TURLANSKIY, M.A., inzh., zam.
glavnogo red.; LAZAREV, V.I., inzh., red.; SHABSYUK, S.T.,
red.; KHAVIN, B.N., red.izd-va; HUDAKOVA, H.I., tekhn.red.

[Collection No.27 of consolidated cost indexes of water-supply
and sewer structures and buildings to be used in the revaluation
of capital assets] Sbornik no.27 ukрупnennykh pokazatelei
stoimosti zdaniy i sooruzheniy vneshnego vodosnabzheniya i kana-
lizatsii dlia pereotsenki osnovnykh fondov. Moskva, Gos.izd-vo
lit-ry po stroit., arkhitekt. i stroit.materialam, 1959. 197 p.
(MIRA 12:8)

1. Russia (1923- U.S.S.R.) Gosudarstvennyy komitet po delam
stroitel'stva.

(Water-supply engineering)

(Sewage)

S/020/60/132/04/27/064
B011/B003

5.3200
AUTHORS:

Kazanskiy, B. A., Academician, Panchenkov, G. M.,
Lazarev, V. I.

TITLE:

Hydrogenation of 2-Methyl-butene-1 in the Presence of
Platinum Black in Deuterated Alcohol

PERIODICAL:

Doklady Akademii nauk SSSR, 1960, Vol. 132, No. 4,
pp. 832-835

TEXT: In the article under review, the authors intend to clarify the problem as to whether the hydrogen of alcohol hydroxyl directly participates in the reaction of catalytic hydrogenation. For this purpose they studied the hydrogenation mentioned in the title. The rectified ethanol which served as medium contained 3.3 per cent of deuterium in the hydroxyl. The hydrocarbon formed was analyzed on a mass spectrometer in order to determine the deuterium content. Results listed in Table 1 demonstrate that isopentane with a content of about 2.3 per cent of monodeuteroisopentane forms in hydrogenation. No dideuteroisopentanes

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Hydrogenation of 2-Methyl-butene-1
in the Presence of Platinum Black in
Deuterated Alcohol

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were detected. In control experiment No. 15 isopentane was shaken with deuterated alcohol and platinum black at 20°C for 3 h 15 min in nitrogen atmosphere. No exchange of isotopes was found to occur. 2-methyl-butene-1 without hydrogen yielded 0.67 per cent of monodeuteroolefin in experiment No. 13. Hence, the exchange of hydrogen for deuterated alcohol on platinum attains equilibrium in the range of measuring accuracy. The yield of isotopic exchange (0.67 per cent) absolutely exceeds the portion of this exchange reaction in the total deuterium content of the hydrogenation product. The yield of isotopic exchange between the olefin and the alcohol decreases in the course of reaction since the concentration of olefin drops constantly. The surface concentration of the olefin which was sorbed on the catalyst is also lower than in the control experiment, since hydrogen is sorbed on part of the active centers of the catalyst. The authors explain the formation of monodeuteroparaffin to the effect that hydrogenation and exchange take place independently of one another. In hydrogenation practically no exchange between olefin and alcohol occurs. The exchange of hydrogen for deuterated

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Hydrogenation of 2-Methyl-butene-1
in the Presence of Platinum Black in
Deuterated Alcohol

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B011/B003

alcohol yields hydrogen with a content of 3.4 per cent of HD, whereas isopentane formed by hydrogenation contains only 2.3 per cent of monodeuteroisopentane. The authors explain this fact by the different rates of exchange reactions of C_2H_5OD for H_2 as well as by olefin hydrogenation on the surface of the catalyst. Hence it results that the hydroxyl hydrogen of the alcohol solvent does not directly participate in the reaction of hydrogenation. The hydroxyl hydrogen is exchanged for the hydrogen sorbed on the surface of the catalyst. If, however, an olefin is present in the system, it reacts with the sorbed H_2 and HD in such a way that it is also sorbed on platinum. Thus, the two possible reactions of isotopic exchange between the olefin and hydrogen and the alcohol as well as the reaction of hydrogenation of the olefin have a limiting stage in common, i.e., the sorption of hydrogen on platinum. If all these processes take place simultaneously, the exchange reactions are retarded, whereas the exchange of the olefin for alcohol is completely suppressed. The authors thank L. N. Gorokhov, Z. V. Gryaznova, and I. V. Gostunskaya for their assistance. There are 2 tables and 17 references,

Card 3/4

LAZAREV, V.I.

Pathological and anatomical changes in the bronchial stump at
various periods of time after pneumonectomy and lobectomy. Vest.
khir. 85 no. 7:59-67 Je '60. (MIRA 14:1)
(LUNGS—SURGERY)

RABICHEVA, L.M.; LAZAREV, V.I.; ALYUSHIN, Ye.I.; POLETAYEV, G.S.;
Prinimali uchastiye: TARASOV Ye.I.; AFONIN, P.I.; SYROVEGINA,
K.V., nauchnyy sotrudnik; LEVIN, I.Kh., nauchnyy sotrudnik

Obtaining liquid zinc in the electric smelting process. Sbor.
nauch. trud. Gintsvetmeta no.18:175-186 '61. (MIRA 16:7)

1. Nachal'nik elektrotermicheskoy opytnoy ustanovki Belovskogo
tsinkovogo zavoda (for Tarasov). 2. Starshiy master elektrotermi-
cheskoy opytnoy ustanovki Belovskogo tsinkovogo zavoda (for Afonin).
3. Gosudarstvennyy nauchno-issledovatel'skiy institut tsvetnykh
metallov (for Syrovegina, Levin).
(Zinc—Electrometallurgy)
(Liquid metals)

LAZAREV, V.I.

Development of instruments for measuring the time parameters of
periodic signals. Trudy VNAIZ no.10:3-17 '62. (MIRA 16:11)

GOLYAND, S.M.; KRAPIVINA, T.K.; LAZAREV, V.I.

Isotopic exchange of hydrogen sulfide with the products of its
sorption on catalytic and activated carbon. Zhur. fiz. khim.
36 no.6:1320-1324 Je'62 (MIRA 17:7)

1. Gosudarstvennyy nauchno-issledovatel'skiy institut po pro-
myshlenn y sanitarnoy ochistke gazov.

LAZAREV, V.I.; VETSHEV, S.T.

Measurement of rotor oscillations in the motor of the heads
block of a video tape recorder. Trudy VNAIZ no.10:18-26 '62.
(MIRA 16:11)

GOLYAND, S.M.; LAZAREV, V.I.

Spectrometric determination of small concentrations of carbonyl sulfide and carbon disulfide in pure gases. Zhur, anal. khim. 17 no. 6: 734-738 S '62. (MIRA 16:1)

1. Nauchno-issledovatel'skiy institut po promyshlennoy i sanitarnoy ochistke gazov, Moskva.
(Carbonyl sulfide—Spectra) (Carbon disulfide—Spectra)

LAZAREV, Vladimir Ivanovich; PARKHOMENKO, Vladimir Ivanovich;
TAGER, P.G., red.; BUL'DYAYEV, N.A., tekhn. red.

[Magnetic recording of television images] Magnitnaia zapis'
televizionnykh izobrazhenii. Moskva, Gosenergoizdat, 1963.
86 p. (Massovaya radiobiblioteka, no.462) (MIRA 16:5)
(Video tape recorders and recording)

S/187/63/000/002/003/004
A004/A126

AUTHOR: Lazarev, V. I.

TITLE: Automatic control system of the film and head motion speed in
video magnetic sound recorders

PERIODICAL: Tekhnika kino i televideniya, no. 2, 1963, 37 - 41

TEXT: The author analyzes the purpose of the automatic system for controlling the film and head motion in video magnetic sound recorders with transverse line recording. He describes the block diagram of the system and its basic structural elements, viz. phase discriminator and controllable oscillator. The driving motor of the film stretching mechanism operates without control during recording. The control system maintains a constant ratio of phases between the revolution frequency of the motor to the signal base frequency, so that the instantaneous angular position of the rotor and, consequently, that of the revolving heads is rigidly connected to the phase base signal and does not vary. The phase discriminator consists of a trigger system with two stable states. The oscillator circuit parameters are selected in such a way that its static characteristics remain

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Automatic control system of the film and...

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A004/A126

linear over all sections of possible signal variations by time errors, while its mean frequency amounts to 50 cps. The connection of the phase discriminator to the oscillator does not cause any deterioration, but, on the contrary, somewhat improves the stability of the control system as a whole. The described control system is used in the "Kadr" video magnetic sound recorder. There are 4 figures.

Card 2/2

ATCINA, Ye.P.; LAZAREV, V.I.

Sorption of thoron with activated carbon. Zhur. prikl. Khim. 37
no.11:2518-2521 N 1964 (MIRA 18:1)

1. Gosudarstvennyy nauchno-issledovatel'skiy institut po promyshlennoy i sanitarnoy ochistke gazov.

KLYACHKO, V.A., doktor tekhn. nauk; LAZAREV, V.I., inzh.

Selecting a source of water supply. Vol. 1 ser. tekhn. no.3:
1-3 '64 (MIRA 18:2)

L 12926-66 EWT(m)/EWA(d)/EWP(t)/EWP(z)/EWP(b) JD

ACC NR: AP6000180

SOURCE CODE: UR/0032/65/031/012/1437/1438

AUTHOR: Lazareva, V. I.; Lazarev, A. I.

ORG: Novomoskovskiy Affiliate, State Scientific Research and Design Institute of the Nitrogen Industry and Organic Synthesis (Novomoskovskiy filial Gosudarstvennogo nauchno-issledovatel'skogo i proyektnogo instituta azotnoy promyshlennosti i produktov organicheskogo sinteza)

TITLE: Extraction of photometric determination of bismuth in cast iron

SOURCE: Zavodskaya laboratoriya, v. 31, no. 12, 1965, 1437-1438

TOPIC TAGS: photometric analysis, microchemical analysis, bismuth, cast iron

ABSTRACT: The feasibility of the iodide method of determining trace quantities of bismuth in cast iron is investigated. Ascorbic acid, thiocarbamide, potassium iodide, and citric acid were added to a solution of cast iron. The bismuth complex was extracted by ethyl- or amylacetate. Bismuth was separated from the extract by means of a citric acid solution of pH = 9. The final bismuth content was determined after re-extraction by the iodide method; the sensitivity of the method was as high as $5 \cdot 10^{-4}\%$ from 1 g suspensions. Tabular data were given as follows:

UDC: 546.87 : 543.432

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ACC NR: AP6000180

Determination of bismuth content in cast iron

Added Bi, micrograms	Found Bi		% Error
	micrograms	$10^{-3}\%$	
--	23; 24; 25	2.4	--
18	43; 45; 47	4.5	+7
--	18	1.8	--
18	40	4.0	+11
--	7	0.7	--
18	27	2.7	+8

Antimony (III) in quantities up to 0.3 mg/ml did not hinder the determination. The details of the method are given. Optical density was measured on an FEK-N-57 with a blue filter ($\lambda_{\text{eff}} = 453$ millimicrons) in a 50 mm cuvette, and compared to water. The bismuth analysis was based on the formula

$$\% \text{Bi} = \frac{D_x - D_0}{D_{x+a} - D_x} \cdot a \cdot 2500,$$

where a is quantity of added bismuth; D_0 , D_x and D_{x+a} are optical densities of dummy

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ACC NR: AP6000180

solution, the analyzed solution, and the analyzed solution with bismuth additions, respectively. Methods of increasing the sensitivity are discussed, especially with regard to the use of differential aberration in the optical density apparatus. Orig. art. has: 1 table.

SUB CODE: 07,14/

SUBM DATE: 00/

ORIG REF: 002/

OTH REF: 000

Card 3/3

LAZAREV, V.I.; MOISEYEV, Yu.V.; GOLYAND, S.M. (Moscow)

Hydrolysis of carbon disulfide in alkali solutions. Zhur. fiz.
khim. 39 no.2:376-380 F '65. (MIRA 18:4)

1. Institut khimicheskoy fiziki AN SSSR i Gosudarstvennyy nauchno-
issledovatel'skiy institut po promyshlennoy i sanitarnoy ochistke
gazov.

LAZAREV, V.I.; MOISEYEV, Yu.V.

Hydrolysis of carbon disulfide in alkali solutions. Zhur. fiz.
khim. 39 no.2:445-447 F '65. (MIRA 18:4)

1. Gosudarstvennyy nauchno-issledovatel'skiy institut po promyshlen-
noy i sanitarnoy oчитke gazov i Institut khimicheskoy fiziki AN
SSSR.

YASSENOV, V.M., head. tech. rank; LAZAREV, V.I., inst.

The 3K planetary transmission or with a single-toothed satellite.
Vest. mashinost. 45 no. 12:7-10 D'65 (MHA 19:1)

LAZAREV, V.L.

KHIL'KEVICH, F.A., inzhener; MANTUEHOV, G.V., inzhener; LAZAREV, V.L.;
BAZILEVICH, S.V.

Methods of improving blast furnace process indices. Stal' 16
no.12:1061-1067 D '56. (MLRA 10:9)

1. Novo-Tagil'skiy metallurgicheskiy zavod.
(Blast furnaces)